**Unit One: Substance Use and Addiction Name**

**Unit Objectives:**

1. To examine the unhealthy risk behaviors and leading causes of death for teenagers in the United States
2. To define the 7 main categories of drugs
3. To understand the potential short and long term effects legal and illegal drugs can have on the body and how avoiding substances can promote health
4. To discuss how drugs are scheduled by the US government
5. To examine the pros and cons of legalizing marijuana for medicinal and recreational purposes.
6. To understand how drugs effect normal neuron communication in the brain
7. To label the parts of a neuron and explain normal neuron communication
8. To discuss the physical, social, and mental issues associated with substance addiction
9. To explain how alcohol effects each person differently
10. To discuss factors which impact the absorption of alcohol
11. To explain appropriate and inappropriate actions to take if a person is showing signs of alcohol poisoning

**Assessments: This unit will be assessed with a test on Friday 9/19**

**Assessment Preparation:** Please keep up with the assignments as listed on the syllabus and study the notes taken in and out of class on a nightly basis, we will do a brief one class period review prior to the assessment, but it is the student’s responsibility to prepare for the exam throughout the unit. All of the material in the packet will be included on the exam.

**Packet:** This packet will be collected and assessed as part of the

“Unit Packet” component of your overall grade. (25% of total grade)

**Homework:** You are reminded that if you do not have an assignment completed on the assigned due date (collected or checked) the maximum grade you can receive is a 50 until the end of that unit.

[**www.ghshealth.wikispaces.com**](http://www.ghshealth.wikispaces.com)**: For Assignment Updates**

**Extra Credit:** Please travel to the wiki and click on the “Substance Abuse and Addiction”

link. Under “Unit Review” there is an extra credit quizlet vocab assignment that you can complete for 5 extra credit points on the unit test

**Unit One Syllabus: Substance Abuse and Addiction**

|  |  |  |
| --- | --- | --- |
| **Day** | **Lesson Objectives** | **Assignments** |
| **8/28** | Course Introduction  Tell Me About You | Sign Course Outline and Read Article  “Teens are Hardwired for Risky Behavior”  Answer Questions for 9/2 |
| **9/2** | Themes: Risk Taking  And Decision Making  The Teenage Brain  Intro: Substance Abuse Unit | Read pgs. 3 & 4, take notes on chart on  Pg. 5 for 9/3 and 9/4 |
| **9/3 & 9/4** | Drug Effects/Categories &  Federal Scheduling  Lecture: Stimulants |  |
| **9/5** | Lecture: Narcotics &  Hallucinogens | Complete Alcohol 101 Assignment on pgs.  9 - 11 for Monday 9/8 (DON’T complete  the What Would You Do Assignment |
| **9/8** | Depressants:  Alcohol 101 | Respond to What Would You Do  Scenarios on pgs. 11 & 12 for 9/9 |
| **9/9** | Alcohol Scenarios:  What Would You Do?: Group  Brainstorming Activity &  Discussion  Videos: Sean Carter Story | Go to wiki and complete online survey:  What do I think and know about  Marijuana? |
| **9/10 & 9/11** | Marijuana 101: History  Current Research and Effects |  |
| **9/12** | Speaker: Substance Abuse  Counselor: Ms. Emerson  Medical Marijuana | Read “Understanding Brain Chemistry”  On pgs. 15 & 16, complete the vocab &  Question assignments on pgs. 17 & 18 for Tuesday 9/16 |
| **9/15** | Finish Medical Marijuana  Videos: Pro/Con Discussion  Thesis Writing: Legalize or Not? | Complete thesis writing activity for 9/17 &  9/18 |
| **9/16** | Reality of Addiction  How Would it Feel?  Drugs and the Brain | Complete review sheet of addiction info  And vocab for 9/17 and 9/18 |
| **9/17 & 9/18** | Review Addiction Info  Unit Review |  |
| **9/19** | Unit One Test | Packet will be collected, all missing work  **must** be turned in today for partial credit |

# Drugs 101: Drug Categories

There are several terms that are commonly used in discussing drugs and drug use that you should be familiar with prior to beginning our discussion of substance use and abuse.

The word “drug” is defined as “any substance, natural or artificial, other than food, that by its chemical nature alters structure or function in a living organism.” Drugs and medications of abuse can be grouped together into categories based on similarities between how they work and what effects they will produce in the human body and brain. As you read about each drug category, please take brief notes on the page that follows indicating a definition, general effects, and several drug examples.

#### Stimulants

These drugs speed up the body’s central nervous system and create a feeling of energy, increased wakefulness, and decreased appetite. Users often become more talkative, anxious, or irritable. Other effects can include an increase in heart rate and blood pressure, an increase in body temperature, muscle spasms, blurred vision, and nausea. The effects on the heart can be so severe that the heart will lose its ability to beat in a normal rhythm causing a lethal condition known as fibrillation. When the effects of a stimulant wear off, the user is typically left with feelings of sickness and a loss of energy. Stimulant drugs are extremely addictive and will lead to cravings.

**Types of drugs include**: Cocaine Methamphetamines Amphetamines(ADHD medications) Nicotine Caffeine

#### Depressants

Depressant drugs slow down activity in the central nervous system of your body. These drugs are also called “downers” because they slow brain and heart function, and seem to give feelings of relaxation. Thus, they are often used to treat anxiety and sleep disorders. They can also cause dizziness, blurred vision, nausea, amnesia, confusion, reduce reaction time, and impair judgment. They can lead dependence and tolerance very quickly, causing the user to need more of the drug to get the same effects.

**Types of drugs:** Barbiturates Benzodiazepines GHB/Rohypnol Alcohol

#### Inhalants

Inhalants are sniffed or huffed and give the user an immediate high. Many young people believe they are harmless and use they to achieve a quick high, unfortunately, their use can result in sudden mental damage and even death. When inhalants are taken, the body becomes deprived of oxygen, causing a rapid heart beat. Other effects include slurred speech, lack of coordination, dizziness, nausea, affected sense of smell, difficulty walking and confusion. The most significant and alarming effect is brain cell death. Many users will have irreversible damage done to brain function and will live a life time with memory problems, poor thinking skills, communication difficulties, and clumsy or slow muscle function. NONE of these products are safe or safer to use for this purpose.

**Types of drugs include:** Glues Paint thinner Gasoline Laughing gas Aerosol sprays

#### Narcotics or Opiates

Narcotics or opiates are generally used legally to treat pain, but can also cause drowsiness, confusion, nausea, feelings of euphoria, significantly slowed breathing, and death. If a person takes one of these drugs through a means other than swallowing a pill it can be extremely dangerous. Tolerance and addiction are extremely common among users of these drugs, and the withdrawal symptoms associated with not having the drug are very painful. Some are legal and others are not.

**Types of drugs include:** Codeine Heroin Morphine Oxycodone Hydrocodone

#### Anabolic Steroids

Steroids are a synthetic form of the male hormone testosterone, and are taken to improve physical performance as well as to enlarge muscles and increase strength. Negative effects of steroids include baldness, cysts, oily hair and skin, acne, decrease in testicle size, breast development in men, heart attack, stroke and change in voice. Hostility and aggressive behavior are also frequent side effects of anabolic steroids.

#### Hallucinogens

These drugs change the mind and cause the user to hear and see things that are not there. Hallucinogens affect the body’s self-control, such as speech and movement, and often bring about hostility, or rapid changes in emotions. Other negative side effects of these drugs include heart failure, increased heart rate, higher blood pressure and changes in the body’s hormones. Some users will experience permanent psychosis, or an inability to recognize reality and function in society.

**Types of drugs include:** LSD Mescaline DXM(cough medicine/Robo) Marijuana Mushrooms

**Drugs 101: Use, Abuse & Addiction**

Drug addiction is a dependence on an illegal drug or medication. When a person is addicted, they may not be able to control their drug use and they may continue using the drug despite the harm it causes. Drug addiction can cause an intense craving for the drug. The drug addicted person may want to quit, but most people find they can't do it on their own. For many people, what starts as casual use leads to drug addiction. Drug addiction can cause serious, long-term consequences, including problems with physical and mental health, relationships, employment and the law. Unfortunately with teenagers, their brains are wired in a way that makes drug use and addiction more likely, while the damage they cause can be much more severe, since their bodies and brains are still developing.

Drug addiction can be characterized by many different signs:

**Potential Signs of Addiction:**

* Extreme mood changes – happy, sad, excited, anxious, etc
* Sleeping a lot more or less than usual, or at different times of day or night
* Changes in energy – unexpectedly and extremely tired or energetic
* Weight loss or weight gain - Unexpected and persistent coughs or sniffles
* Seeming unwell at certain times, and better at other times
* Pupils of the eyes seeming smaller or larger than usual
* Secretiveness/Lying - Stealing
* Financially unpredictable, having large amounts of cash at times but no money at all at other times
* Changes in social groups, new and unusual friends, odd cell-phone conversations
* Giving up recreational activities, not participating in things that used to be important
* Drop in grades, not caring about school
* Repeated unexplained outings, often with a sense of urgency
* Isolation: Hanging out alone or only with certain people

Drug abuse and addiction have negative consequences for individuals and for socciety. Estimates of the total overall costs of substance abuse in the United States, including productivity and health- and crime-related costs, exceed $600 billion annually. This includes approximately $193 billion for illicit drugs,[1](http://www.drugabuse.gov/publications/drugfacts/understanding-drug-abuse-addiction#references) $193 billion for tobacco,[2](http://www.drugabuse.gov/publications/drugfacts/understanding-drug-abuse-addiction#references) and $235 billion for alcohol.[3](http://www.drugabuse.gov/publications/drugfacts/understanding-drug-abuse-addiction#references) As staggering as these numbers are, they do not fully describe the breadth of destructive public health and safety implications of drug abuse and addiction, such as family disintegration, loss of employment, failure in school, domestic violence, and child abuse.

As a person continues to use a drug, they will begin to develop tolerance. Tolerance refers to the idea that as you use a drug, over time, the person will get a less intense effect from the same drug dose. Thus, they need to take more of the drug to get the same effect. Tolerance to a drug is considered a key component to addiction. In addition to becoming tolerant, the drug addicted person will begin to experience physical or psychological dependence, or in some cases, they will experience both.

Physical dependence is defined by the occurrence of withdrawal symptoms. With some drugs, when the person stops taking the drug abruptly, a set of symptoms begins to appear as the drug level in the system drops. Typical withdrawal symptoms may include cravings, disturbed mood, insomnia, headaches, irritability, etc. For example, as the level of heroin drops in a heroin addict, that person’s nose might run and he or she might begin to experience chills, fever, nausea, vomiting, diarrhea, insomnia, and many other potential symptoms. Withdrawal symptoms can make quitting a drug incredibly difficult, particularly since re-administering the drug will make the withdrawal symptoms go away.

It seems that many teenagers believe that using drugs is “no big deal,” and it is an expectation or normal behavior for teens or college students. In reality, most teens do not use drugs because they recognize the potential harm they can cause. If you start to notice signs of addiction in yourself or a friend, please seek out someone in your life that can help. There are many resources within the school and community that can help teens who are addicted to drugs, quit!

|  |  |  |  |
| --- | --- | --- | --- |
| **Drug** | Definition | **General Effects** | **Drug Examples/Products** |
| Stimulants |  |  |  |
| Depressants |  |  |  |
| Inhalants |  |  |  |
| Narcotics or Opiates |  |  |  |
| Anabolic Steroids |  |  | Anabolic Steroids |
| Hallucinogen |  |  |  |

|  |  |
| --- | --- |
| **Term** | **Definition** |
| **Addiction** |  |
| **Tolerance** |  |
| **Withdrawal** |  |

**Drug Effects:**

Desired Effect:

Undesired Effect:

Example:

Safest Method of Delivery:

Most Unsafe Methods of Delivery:

**Drug Scheduling**:

A method to categorize drugs based on addiction potential,

abuse and medical use. (Controlled Substances Act of 1970)

Scheduling of Drugs

**Schedule I:**

- high potential for abuse- most dangerous

- no accepted medical use in US

- illegal to possess

**Schedule II:**

1. High potential for abuse
2. Has current accepted medical use in US with severe restrictions
3. Abuse may lead to severe dependence

**Schedule III:**

1. Less abuse potential than schedules I and II
2. Has accepted medical use in US
3. Abuse many lead to moderate dependence

**Schedule IV:**

1. Low potential for abuse
2. Has accepted medical use in US
3. Abuse may lead to limited dependence

**Schedule V:**

1. Very low potential for abuse - prescriptions not always required
2. Has accepted medical use in US
3. - least dangerous



Marijuana, ecstasy, heroin, GHB, LSD

Ritalin/Concerta, cocaine, morphine, codeine, oxycodone

Anabolic steroids, marinol,

Valium, anti-depressants, anti-diarrheals

Cough syrups without DXM









|  |  |
| --- | --- |
| **Cocaine** |  |
| Drug Category |  |
| Schedule and  Medical Use |  |
| Effects |  |
| Concerns |  |

|  |  |
| --- | --- |
| **Methamphetamines** |  |
| Drug Category |  |
| Effects & Problems | **Also called “Poor Man’s Cocaine”: Made in Home METH Labs from Household Products** |

|  |  |
| --- | --- |
| **Amphetamines**  **(Ritalin/Adderall)** |  |
| Drug Category: |  |
| Schedule & Medical Use |  |
| Why do people use them recreationally? |  |
| Concerns/Issues |  |

|  |  |
| --- | --- |
| **Prescription Painkillers** | **Oxycontin, Hydrocodone, Codeine, Fentanyl, Vicodin, Demerol, Percocet, Dilaudid** |
| Drug Category: |  |
| Medical Uses & Effects |  |
| What is Controlled Release? |  |
| Why are they used  Recreationally? |  |
| Dangers/Concerns |  |

**Cough Medication with DXM**

|  |  |
| --- | --- |
| Drug Category |  |
| Laws |  |
| Effects |  |
| Concerns/Issues |  |

**Synthetic Marijuana**

|  |  |
| --- | --- |
| Drug Category |  |
| What is it? |  |
| Laws |  |
| Concerns/Issues |  |

**ALCOHOL 101**

540,000 people are injured and 30,000 people are killed in alcohol-related auto accidents each year. Approximately 450 people are killed each week in alcohol-related accidents. Every 20 minutes, a life is lost in an alcohol-related accident in the United States.

**First, Alcohol is a depressant drug, which means it slows down your central nervous system and vital functions. As a person drinks more alcohol, breathing and heart rate are continuing to decline, both reasons that make the over consumption of alcohol so dangerous!**

**BAC is your Blood Alcohol Concentration**. When a person consumes alcohol it will travel through the stomach and small intestines, and generally enter the blood stream within minutes. The bloodstream transports alcohol throughout the body, especially to your lungs and brain, where alcohol acts directly. This transportation system is very fast. Within 2 minutes after drinking alcohol, brain tissues accurately reflect the blood alcohol level.

**But wait, there's more. Don't forget, all these factors will affect your BAC too:**

- MOOD          - FOOD IN YOUR STOMACH - GENDER     - HEALTH/SICKNESS

- WEIGHT\*     - AMOUNT OF ALCOHOL\*            - TIME/SPEED OF DRINKING

**\* BAC is primarily determined by how much alcohol you drink and your weight.**

**Foods and liquids can change how alcohol effects a person:**

- Eating prior to drinking alcohol will slow its absorption, creating a safer situation for the drinker.

- If plain water is mixed with alcohol, the body absorbs it more slowly, creating a safer situation for the drinker.

* If you add a carbonated beverage to your drink, then the drink will absorb more quickly into the

body, causing you to get intoxicated faster. (so…soda + alcohol = dangerous)

**Men vs. Women:** Usually BAC is higher for women because women typically weigh less, have more body fat, and produce 1/2 of the stomach enzyme (alcohol dehydrogenase) that breaks down alcohol. If a woman keeps up with a man drinking, her BAC will be higher than the man's.

**How Quickly Does Alcohol Leave the Body:** Many resources will claim that the body can process one drink per hour. However, since every person’s body is different and MANY factors influence the absorption of alcohol, the more appropriate way to think about the break down of alcohol is to use the .02 Rule. **The .02 Rule: BAC will drop by .02% each hour.** In addition, there are many misconceptions about what will help a person sober up faster. A cold shower, coffee, soda or energy drinks will not sober a person up. The ONLY thing that allows a person to sober up is TIME!

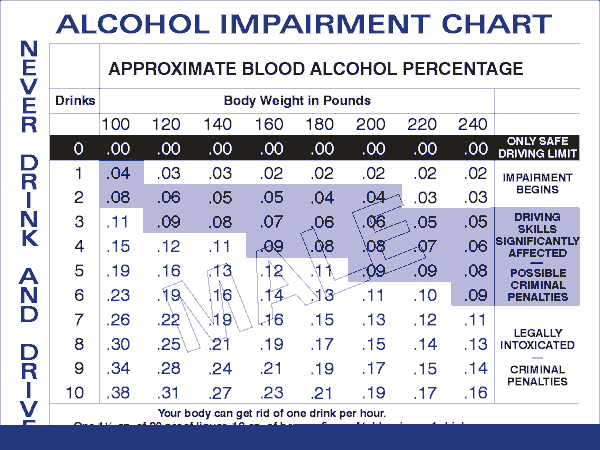
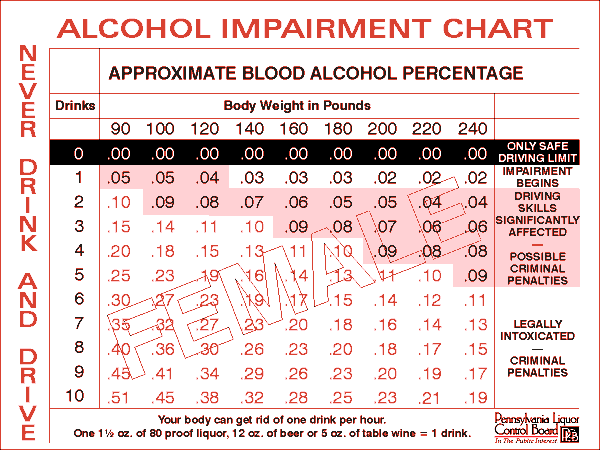
**Energy Drinks and Alcohol:** Fatigue is the body's way of saying it's had enough to drink and it's dangerous to continue to try to fool your body that you're not as drunk as you really are, according to Steve Clarke, Director of the College Alcohol Abuse Prevention Center."Even though energy drinks have stimulants in them, the alcohol is still going to slow vital functions.” "You may feel more alert but actually the alcohol is having the same effect on you. So you might perceive that you are less impaired when in actuality you are not less impaired." “Energy drinks have a lot of stimulants in them like ginseng and taurine, while alcohol is a depressant so by mixing the two you're sending mixed messages to your nervous system which can cause cardiac related problems," Clarke said. Also, alcohol makes people dehydrated, he said, which is one of the reasons why people have hangovers, and the caffeine in the energy drinks is a diuretic, which also causes people to lose water. So, combining alcohol and energy drinks cause a doubling of the dehydration effects.

**Acute Alcohol Poisoning** can be EXTREMELY dangerous. And there is a big difference between when it is ok to sleep it off, and when you need to do the right thing, like calling 911, for a friend.

**Here are the some of the critical symptoms of acute alcohol poisoning:**

\* Mental confusion, stupor, coma, or person cannot be roused \* Vomiting \* Seizures

\* Slow breathing (fewer than eight breaths per minute \* Irregular or slow breathing rate \* Hypothermia, bluish skin

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**Effects At Specific B.A.C. Levels:**   
  
**0.02-0.03 BAC**: Lightheaded, relaxed, sensation of warmth, may feel “high.” Minor impairment of judgement.

**0.04-0.06 BAC**: Feeling of being “buzzed.” Will feel relaxed and euphoric (happy), have lower inhibitions. Some minor impairment of reasoning and memory. Less cautious. Your behavior may become exaggerated and emotions intensified (Good emotions are better, bad emotions are worse)  
  
**0.07-0.09 BAC**: Legally drunk. Impairment of balance, speech, vision, reaction time, and hearing. Euphoria. Judgment and self-control are reduced, and caution, reason and memory are impaired. You will probably believe that you are functioning better than you really are.  
  
**0.10-0.125 BAC**: Significant impairment of motor coordination and loss of good judgment. Speech may be slurred; balance, vision, reaction time and hearing will be impaired. Euphoric.  
  
**0.13-0.15 BAC**: Gross motor impairment and lack of physical control. Blurred vision and major loss of balance. Euphoria is reduced and dysphoria (anxiety, restlessness) is beginning to appear. Judgment is severely impaired.  
  
**0.16-0.19 BAC**: VERY drunk: Strong state of depression, nausea, disorientation, feeling very dizzy. Increased loss of motor impairment, blurry vision. Strong feelings of dysphoria. The drinker has the appearance of a "sloppy drunk."  
  
**0.20-.24 BAC**: Felling very dazed and confused. May need help to stand or walk. Likely to experience nausea and vomiting at this level. The gag reflex is impaired and you can choke if you do vomit. Blackouts are likely at this level so you may not remember what has happened. Decreased sensations of pain.  
  
**0.25-.30 BAC**: All mental, physical and sensory functions are severely impaired. Increased risk of choking on vomit and of seriously injuring yourself by falls or other accidents. Very little comprehension of where you are, may pass out suddenly.  
  
**0.35 and up BAC:** Coma is likely. This is the level of surgical anesthesia. Acute alcohol poisoning, death due to respiratory arrest (stop breathing) is likely in 50% of drinkers.

**Use the article and BAC tables and effects list above to answer the questions below:**

1. Describe the process through which alcohol gets to the brain. Include how quickly it occurs.
2. Identify the seven factors that determine what your BAC will be **AND** circle the two that primarily determine how alcohol will affect you.

a. b. c. d.

e. f. g.

1. How can food, water, and soda change how alcohol affects a person?
2. Discuss 3 reasons why women are affected by alcohol more quickly than men:

* Using the BAC chart for your gender , how many drinks would it take for you to reach the legal adult intoxication level of .08?\_\_\_\_\_\_\_\_
* What would your BAC be if you consumed 5 drinks?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* List several effects you might experience at this BAC level based on the information in the article?(see Effects list)
* What is the .02 rule?
* List 3 myths related to sobering up an intoxicated person AND identify the only factor that ACTUALLY gets alcohol out of the system?
* Discuss at least 3 concerns associated with consuming an energy drink or caffeine while also consuming alcohol.

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**What Would You Do? : Read each scenario and write down your thoughts. Be realistic and honest.**

**A. You are at a party with a group of friends. One of your friends is getting really intoxicated. He is stumbling around the party, has fallen down a few times, and just vomited in the bathroom. Someone directs him to a bedroom and convinces him to go to bed.**

Consider: Would you intervene in any way? Why or why not? What would you be concerned about in this situation? What would be the right thing to do? What are signs of alcohol poisoning according to the article?

**B. You are at a party and you see someone with keys, who is obviously intoxicated, heading toward his car. There are two other people with him who also look like they have been drinking. What do you do?**

Consider: What if the person got in the car and drove away? What action could you then take?

**C. You see a friend of yours take a couple of pills while drinking one night at a party. You ask her what she is taking and she says it is a Percocet (rx painkiller) that her Mom is on.** Are you concerned? Why or why not? What would you do?

**D. You are talking with a friend the morning after a party. She tells you that she and her boyfriend had sex the night before and because they were intoxicated, they didn’t use a condom.** What would you tell her? What options does she have or should she consider?

**F. You are at a party and there is a person there who is taking pictures of people at the party. You overhear the person saying that they plan on putting the pictures on their Facebook page.** What do you do and what would you be concerned about? Would it change if you were an athlete at GHS?

**G. Brainstorm a list of ways to avoid drinking at parties as well as “safer drinking” tips for teens and college students: (Include at least 10 tips)**

**Marijuana 101**

Drug Effect: Chemicals:

Duration of Effects: Legal Status:

|  |  |
| --- | --- |
| **Immediate effects felt from using marijuana**  **Impact on learning and memory**  **Impact on IQ** |  |
| **Potential for Addiction**  **Withdrawal Symptoms** |  |
| **Mental Health Issues?** |  |
| **Effects on the heart** |  |
| **Effects on the Lungs** |  |
| **Effects on Reproductive System (male and female)** |  |

**Medical Marijuana:**

Federal Law: State Law:

Access:

Use and Benefits:

Marinol: Law:

Fill in the chart below to summarize the pros and cons associated with the legalization of marijuana for RECREATIONAL purposes. Consider laws, regulations, physical effects, social issues, recreational use, etc. Be prepared to discuss your thoughts and opinion with the class.

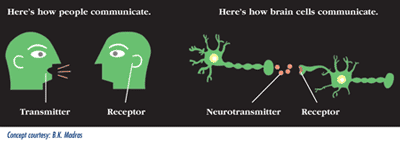
|  |  |
| --- | --- |
| Pros of Legalizing Recreational Marijuana | Cons of Legalizing Recreational Marijuana |
|  |  |

**Understanding Brain Chemistry and Drugs: How Does the Brain Send Messages?**

Your brain is full of billions of microscopic cells called **neurons** or “nerve cells” that work together to allow your brain to communicate. We have about 100 billion neurons in our body. Networks of neurons pass messages back and forth within the brain, spinal column, and body. These nerve networks control everything we feel, think, and do. To picture the size of a neuron, think about the fact that 30,000 neurons can fit on the head of a pin!

Neurons can be MOTOR, SENSORY or INTERNEURONS. A sensory neuron carries information from the body back to the brain, like telling your brain that you are touching a hot stove. A motor neuron carries information from the brain back to the body, like telling your hand to pull away from the hot stove. Billions of neurons are chained together in a network of nerves. Interneurons communicate messages between sensory and motor neurons. Most neurons in the brain are interneurons. Nerves are large amounts of neurons linked together in a small place (like dominoes). Your nerves send tiny electronic signals through your body to the brain stem and to the main brain to create changes in the body. Those changes include allowing us to feel pain and temperature, to see and to taste, to move our body parts, and to create changes in our mood and emotions.

A neuron has several important parts that allow it to carry out its function. The neuron is made up of an axon and a dendrite. The **axon** is also called the sending part of the neuron, since it is responsible for sending the message to the next neuron. The message is received by the “receiving neuron” or more technically the **dendrite.** The neurons do not touch each other as they communicate; the gap or space between them is referred to as the **synapse**. Since the axon and dendrite of two different neurons do not touch, they must use a chemical, called a **neurotransmitter**, to help them send messages. The neurotransmitter, or chemical, will carry the message across the synapse to the next neuron. It is sort of like a boat that carries a message across the ocean between two nearby islands. Depending on the type of neurotransmitter released, it can cause different changes to result in the body. So, first an electrical impulse will stimulate the axon to release a neurotransmitter (or a chemical messenger) into the gap between them, also called the synapse. The neurotransmitters are then “picked up” by the **uptake receptors** on the dendrite. The uptake receptors are like a lock and the neurotransmitter is the key. When the right key goes in the lock, it can send the message along. Once the dendrite picks up the neurotransmitter the electrical message will continue to be sent. This process repeats itself over and over in rapid succession, relaying the impulse along a sequential chain of neurons, until the impulse/message reaches its destination. After the electrical message is sent, the neurotransmitter in the synapse returns to the axon through the **reuptake pump**. The reuptake pump acts like a vacuum and essentially recycles any unused neurotransmitter that is left in the synapse so it can be used again, the next time.



The neurotransmitters most impacted by drug use are serotonin, dopamine, and endorphins. Serotonin is responsible for regulating mood, emotions, sleep, and appetite. Dopamine is responsible for pleasure, muscle function, and motivation. Endorphins, when released, cause a natural “high,” and produce feelings of happiness and euphoria while also decreasing our sensations of pain.

**How can drugs affect this process?**

Drugs are chemicals, and have the ability to alter how neurons communicate, and in some cases can cause permanent changes to the brain. Once in the brain, drugs of abuse are similar in size and shape to the brain chemicals, neurotransmitters, and thus can interfere with the way nerve cells or neurons normally send, receive, and process information.

Some drugs, such as marijuana, heroin, and prescription painkillers (oxy, hydro, morphine) can activate neurons because their chemical structure mimics that of a natural neurotransmitter; meaning they look and act like a naturally occurring chemical in the brain. This similarity in structure "fools" receptors and allows the drugs to lock onto and activate the neurons. But, since these drugs activate MANY more receptors than the brain normally uses when we experience something pleasurable, the result is a massive release of neurotransmitters causing the high associated with these drugs.

Other drugs, such as amphetamines or cocaine, can prevent the normal recycling of neurotransmitters, resulting in prolonged exposure and thus a more intense effect/feelings. They basically block the reuptake pumps on the axon so the chemicals stay in the synapse, causing a high. This disruption produces a greatly amplified message, ultimately disrupting communication channels. The difference in effect can be described as the difference between someone whispering into your ear and someone shouting into a microphone.

## How do drugs work in the brain to produce pleasure?

Most drugs of abuse directly or indirectly target the brain's reward system by flooding the circuit with a neurotransmitter. Many of these neurotransmitters are present in regions of the brain that regulate movement, emotion, cognition, motivation, and feelings of pleasure. The overstimulation of this system, which rewards our natural behaviors, produces the euphoric effects sought by people who abuse drugs and teaches them to repeat the behavior. Since our brains are wired to repeat pleasurable events, the brain notes that something important is happening that needs to be remembered, and teaches us to do it again and again, without thinking about it. Because drugs of abuse stimulate the same circuit, we learn to abuse drugs in the same way.

## Why are drugs more addictive than natural rewards?

When some drugs of abuse are taken, they can release 2 to 10 times the amount of a neurotransmitter that natural rewards do.[15](http://www.drugabuse.gov/publications/science-addiction/citations#_15) In some cases, this occurs almost immediately (as when drugs are smoked or injected), and the effects can last much longer than those produced by natural rewards. The resulting effects on the brain's pleasure circuit dwarfs those produced by naturally rewarding behaviors such as eating, exercise, and sex.[16](http://www.drugabuse.gov/publications/science-addiction/citations#_16),[17](http://www.drugabuse.gov/publications/science-addiction/citations#_17) The effect of such a powerful reward strongly motivates people to take drugs again and again. This is why scientists sometimes say that drug abuse is something we learn to do very, very well.

## What happens to your brain if you keep taking drugs?

Just as we turn down the volume on a radio that is too loud, the brain adjusts to the overwhelming surges in neurotransmitters by producing less of them or by reducing the number of uptake receptors that can receive signals. As a result, the drug user can no longer experience pleasure from normal, healthy activities that used to cause a neurotransmitter release. This is why the abuser eventually feels flat, lifeless, and depressed, and is unable to enjoy things that previously brought them pleasure. Now, they need to take drugs just to try and bring their neurotransmitter levels back up to normal. And, they must take larger amounts of the drug than they first did to create the desired high - an effect known as tolerance; this begins the cycle of addiction. The occasional user becomes a multiple times a day user and all aspects of their life begin to be affected in a very negative way. **The decision to start using a drug is a VOLUNTARY choice, but quickly becomes INVOLUNTARY when addiction sets in.**

**After completing the reading, fill in the chart below with a definition and visual/memory aid for each vocab term**

|  |  |  |
| --- | --- | --- |
| **Term** | **Definition (please write a definition in your own words)** | **Please draw a picture to help you remember the definition of each vocab term** |
| Neuron |  |  |
| Axon |  |  |
| Dendrite |  |  |
| Synapse |  |  |
| Neurotransmitter |  |  |
| Uptake Receptor |  |  |
| Reuptake Pump |  |  |

**Please answer the questions below using the article about neuron function and drugs on pgs. 16 and 17.**

1. What is the difference between a sensory and a motor neuron?
2. Write a paragraph explaining how neurons function in the brain NORMALLY---use the terms, axon, dendrite, synapse, neurotransmitter, uptake receptor, and reuptake pump. DO NOT copy the article, write a paragraph in your own words that shows your understanding of the process.
3. How do drugs like heroin and prescription painkillers impact neuron function?
4. How do drugs like amphetamines or cocaine impact neuron function?
5. Explain why drugs are more addictive than natural rewards (like exercise or eating)?
6. Discuss at least two changes that will occur in the brain, or to the drug user, if a person keeps using drugs: